



# INTERNSHIP EXPERIENCE AT PUBLIC WORKS DEPARTMENT FOR THE CITY OF SAN DIEGO

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11th Grade  
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# EXECUTIVE SUMMARY

May 30, 2018



To my mentors and teachers,

I am pleased to share my month-long internship experience with you in the form of a mock request for proposal (RFP).

Engineering is an interest that High Tech Chula Vista has instilled in me, throughout the past seven years, through creative and hands on projects. My gratitude cannot be expressed in words for the opportunity I was given by High Tech High and the City of San Diego to intern at the Construction Management and Field Services section of Public Works. I have taken the knowledge I've gained from my time with the surveyors, lab technicians, designers, resident engineers, project managers, and construction managers, and compiled it into the book you are reading right now.

Throughout my month in the Major Buildings division, I was given a lot of different reading material to hopefully decipher and make sense of the broad field of civil engineering. Among the plan sheets, the *Standard Drawings* book, the meeting handouts, the "Whitebook", and the survey maps, I was also given two RFPs for the design of Mira Mesa Community Park Phase II Improvements. I took inspiration from reading through and comparing these proposals to create this mock RFP, starting off with this executive summary.

I hope as you read through this you can get an idea of the abundance of knowledge I was able to absorb. I took notes every day, and I am excited to present my internship experience with you. Again, I cannot express my appreciation enough for the month that reassured me that engineering is what I want to pursue. Thank you for this opportunity!

Sincerely,

Sarina Kuninaga, 11<sup>th</sup> Grade

High Tech High Chula Vista

# IDENTIFICATION OF PROSPER

a. Internship Name and Address of Internship

Construction Management and Field Services, Public Works  
9573 Chesapeake Drive  
San Diego, CA 92123

b. Address of Office

Construction Management  
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San Diego, CA 92123

Architecture Engineering  
Parks Office

525 B Street  
San Diego, CA 92101

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Lab Facility

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San Diego, CA 92123-1801

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## INTERNSHIP CALENDAR

Monday	Tuesday	Wednesday	Thursday	Friday
<p>7</p> <ul style="list-style-type: none"> <li>- First Day of Internship</li> <li>- Tierrasanta Rec. Center Roof and HVAC Improvements</li> </ul>	<p>8</p> <ul style="list-style-type: none"> <li>- Pre-con Meeting for Parkade Elevators</li> <li>- Ned Baumer Pool-Aquatic Center / Hourglass Field Comfort Station ADA Improvements</li> </ul>	<p>9</p> <ul style="list-style-type: none"> <li>- Meeting with Fire and Rescue for Fire Station No.15</li> <li>- Lunch and Learn w/ Jacob</li> <li>- Park de la Cruz Rec. Center Renovations</li> </ul>	<p>10</p> <ul style="list-style-type: none"> <li>- Staff Meeting</li> <li>- Fire Station No.22 Punch Walk</li> </ul>	<p>11</p> <ul style="list-style-type: none"> <li>- Ned Baumer Aquatic Center / Hourglass Comfort Station ADA Improvements</li> </ul>
<p>14</p> <ul style="list-style-type: none"> <li>- San Ysidro Library Progress Meeting</li> <li>- Mission Hills Public Library</li> <li>- Mira Mesa Park Expansion</li> <li>- Cesar Solis Park</li> </ul>	<p>15</p> <p><b>SURVEY</b></p> <ul style="list-style-type: none"> <li>- Construction Markings on Grape St., McGann St., and 54<sup>th</sup> St.</li> </ul>	<p>16</p> <p><b>SURVEY</b></p> <ul style="list-style-type: none"> <li>- Locating Utilities on Convoy St.</li> </ul>	<p>17</p> <ul style="list-style-type: none"> <li>- Site Visit</li> <li>- Mentor Interview</li> <li>- Georgia St. Bridge</li> </ul>	<p>18</p> <ul style="list-style-type: none"> <li>- Chollas Operations Yard Meeting</li> <li>- Pacific Beach Library HVAC and Roof Improvements</li> <li>- Chicano Park Bathroom and Sidewalk Renovations</li> </ul>
<p>21</p> <ul style="list-style-type: none"> <li>- P6 Training</li> <li>- Mission Hills Library Progress Meeting</li> <li>- San Ysidro Library</li> <li>- Linda Vista Skatepark</li> <li>- Linda Vista Storm Drain</li> </ul>	<p>22</p> <p><b>MATERIALS LAB</b></p> <ul style="list-style-type: none"> <li>- Asphalt Testing</li> <li>- Concrete / Asphalt Plants</li> <li>- Slurry Samples in La Jolla</li> <li>- Sand Equivalent Testing</li> </ul>	<p>23</p> <p><b>MATERIALS LAB</b></p> <ul style="list-style-type: none"> <li>- Concrete Break</li> <li>- New Paving</li> <li>- Point Loma Waterline</li> <li>- Sand Cleanness Testing</li> </ul>	<p>24</p> <ul style="list-style-type: none"> <li>- Chollas Operations Yard Meeting</li> <li>- Tierrasanta Building ADA Renovation Pre-con Meeting</li> <li>- Filing Invoices</li> <li>- Central Library Tour</li> </ul>	<p>25</p> <ul style="list-style-type: none"> <li>- Filing Invoices</li> <li>- Key Job for Clerical</li> <li>- Downtown Office Visit</li> </ul>
<p>28</p> <p>Memorial Day</p> <ul style="list-style-type: none"> <li>- No Work</li> </ul>	<p>29</p> <p><b>DOWNTOWN</b></p> <ul style="list-style-type: none"> <li>- Comfort Station Meeting</li> <li>- Civil Engineering Briefing</li> <li>- AutoCAD Briefing</li> <li>- Architecture Briefing</li> </ul>	<p>30</p> <p><b>DOWNTOWN</b></p> <ul style="list-style-type: none"> <li>- Balboa Park Visit</li> <li>- Olive St. Park Meeting</li> </ul>	<p>31</p> <ul style="list-style-type: none"> <li>- Voltaire St. Bridge</li> <li>- Fire Station No.5 Punch Walk</li> <li>- South Mission Beach Lifeguard Station Cost Increase Meeting</li> <li>- Fire Station No.22 Punch Walk</li> </ul>	<p>1</p> <ul style="list-style-type: none"> <li>- Last Day of Internship</li> <li>- City HUB Meeting</li> <li>- Park De La Cruz Rec. Center Renovations</li> </ul>

# CONNECTION BETWEEN DIVISIONS

Throughout the past month I was able to visit four major divisions that contribute to the construction of anything in the City's right of way. City projects can be libraries, fire stations, parks, recreation centers, bridges, sidewalks, road work, and much more. Below I have illustrated how these different divisions connect and intertwine to complete successful projects.

## Surveying

Before any construction or design can start, the City sends out surveyors to locate utilities and the space allotted to build. They locate these items using survey monuments.



## Construction Management

Resident engineers visit their projects daily to oversee construction and make sure contractors are building to plan and code.



## Project Management

Architects and the design team utilize the map the surveyors create to produce sketches or plans of the new project.



## Materials Lab

Lab technicians collect samples on the field and bring it back to the lab to be tested for its strength.



## EDUCATION THROUGH PROJECT SITE VISITS

**Project:** Tierrasanta Recreation Center Roof and HVAC Improvements

**Location:**

11220 Clairemont Mesa Blvd

San Diego, CA 92124



**Tour Guides:** Manuel, Fadi, Tony

**What I Learned:** This was my very first project site which meant everything was new to me! I learned what thermoplastic olefin (TPO) is. It's the material used for roofs, inside swimming pools, cars, and solar panels. TPO is very resistant to UV rays, which is why it's used in these settings. They weld it together and then put extra pieces over the seams to guarantee it's waterproof. The right picture shows the welded TPO on a scupper. A scupper is the outlet that the roof is sloped towards to drain rainwater.

**Project:** Linda Vista Skatepark

**Location:**

6893 Osler St

San Diego, CA 92111



**Tour Guide:** Hiep

**What I Learned:** The Linda Vista Skatepark is the largest skate park in Southern California! The \$3 million project required a lot of geotechnical and structural knowledge. Geotechnical and structural engineers had to figure out how the load distributes on the bridge, how much load the bridge can handle, and how much load the soil underneath can handle. Drain placement was also very important in this project because they didn't want any of the inverted domes to be turned into swimming pools every time it rained. They had to create an extra strong concrete mix to account for the heavy impact of the skateboards, scooters, and bikes. The Linda Vista Skatepark's concrete has a PSI (pound per square inch) of 6,000. To compare, our regular sidewalk concrete is typically 2,500 PSI.

## EDUCATION THROUGH PROJECT SITE VISITS

**Project:** Mission Hills Public Library

**Location:**

209 West Washington St

San Diego, CA 92103



**Tour Guide:** Fadi

**What I Learned:** The Mission Hills Library is a brand new structure with two stories of underground parking. When I visited this project site they were prepping the exteriors for stucco and trenching for gas. The Mission Hills Public Library is a “design build” project, which means the building is 30% designed at the start of construction. In a design build project, they design while they build. This requires a great amount of organization. Contractors need to be very organized with their scheduling. They must take in account which subcontractors should go before others, and how their building is going to affect overall construction that day. Contractors are issued a certain amount of working days to complete the project, which means they need to be efficient as possible.



## EDUCATION THROUGH PROJECT SITE VISITS

**Project:** San Ysidro Public Library

**Location:**

123 East Seaward Ave

San Ysidro, CA 92173



**Tour Guide:** Fadi

**What I Learned:** Usually all projects have progress meetings biweekly with the designers, engineers, architects, clients, and contractors to discuss the project's progression, address any questions, and give insight for the construction that is going to take place before the next meeting. I was able to listen in on a progress meeting for the new San Ysidro Public Library, which was on site. These meetings are usually taken place on site, which allows all the attendees of the meeting to see the progress in person.

During the meeting they were discussing cut sheets, which is a pamphlet or brochure for the project and the technology budget. New internet is called fiber. They were debating whether to install new internet or keep the old internet. Marlon, a city employee from Downtown, told me that because it's a brand new building, it should have new internet.

I also learned that instead of doing an expansion joint, the contractors did a cold joint for the concrete foundation slabs. An expansion joint is two pieces of concrete with a gap in between stuffed with rubber or another material to prevent shaking during an earthquake. A cold joint is two pieces of concrete directly next to each other and touching. They also trenched across the road to get to the pull box for the pipes. The pipe is over 40 feet and was already chlorinated, waiting to be inspected.

This meeting was an interesting one to sit in on because I was able to see the relationship between a resident engineer and a contractor. Sometimes it's a give and take, and you have to butt heads before you can come to a solution.



## EDUCATION THROUGH PROJECT SITE VISITS

**Project:** San Diego Central Library

**Location:**

330 Park Blvd

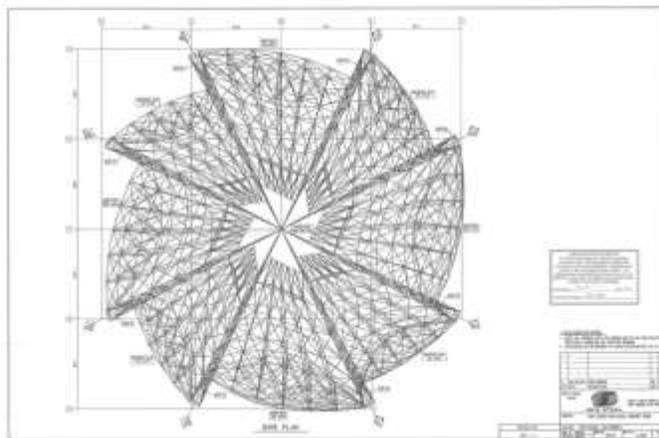
San Diego, CA 92101



**Tour Guide:** Tony

**What I Learned:** My mentor, Tony, was the resident engineer for this grand project. This \$185 million library, located in the heart of Downtown San Diego, was a huge deal for the city and the community. Tony gave us a tour of the nine-story structure, and I was also able to see some rooms not available to the public!

Tony told us that the architect on the project was very adamant about his design and the way he wanted the building to look. The library looks very industrial, from the ceilings to the bathrooms. The concrete arch that is visible right when you walk through the front door is a free-standing arch, meaning it doesn't support anything. The tiny holes all over the surface of the arch and columns in the library were supposed to be filled in, but the architect decided it added to the industrial feel. On some floors, there is a waffle ceiling, which was popular in the sixties. The glass, also known as glazing or storefront, in the library is from Germany and some of the wood accents are from Africa. The signature dome is used to shade the open room on the eighth floor where people can study or read. The view is breathtaking from the conference room in the administration section, and the Commission Room has a unique design.



## EDUCATION THROUGH PROJECT SITE VISITS

**Project:** Georgia Street Bridge Rehabilitation

**Location:**

3878 Georgia St

San Diego, CA 92103

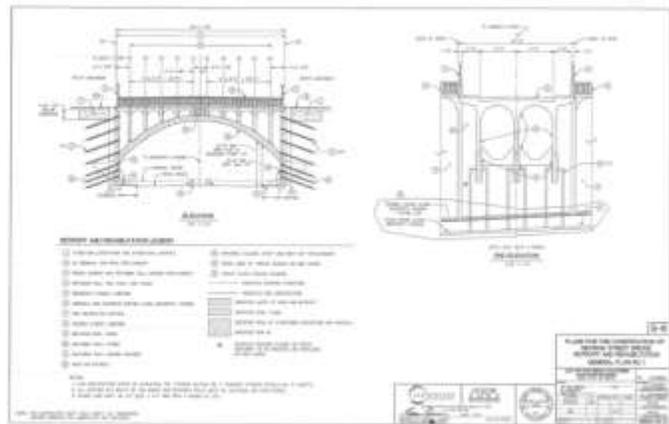
**Tour Guides:** James, Jerald



**What I Learned:** The rehabilitation of the Georgia Street Bridge costs \$112 million and is a three and half year long project. The bridge is considered historic, meaning after the restoration the bridge has to look exactly like it did before. The bridge was originally built in 1914, with four retaining walls. Back then they had smaller cars, which explains how narrow the bridge is. Because the bridge was built so long ago, the formwork has to be made on site.

When I was visiting, they were cutting off the barrier of one of the walls. The walls are held with soil nails, with 22 test nails on each wall. I learned that when the bridge is under the sun it moves; this is called thermal expansion. I also learned that formwork is what you are building, falsework holds up the framework, and scaffolding is what the construction workers stand on. Shotcrete is concrete that is shot to the wall using pressure, and it is used to fill holes in the wall. Rebar size is measured from one through eight with one being 1/8" diameter and eight being a one-inch diameter.

The bridge workers often work night hours because they have to close the road down when they demolish a bridge. The bridge section is the smallest section in Construction Management and Field Services, making up 7 workers who all must be a registered engineer.



## EDUCATION THROUGH PROJECT SITE VISITS

**Project:** Park De La Cruz Recreation Center Renovations

**Location:**

3603 38<sup>th</sup> Street

3901 Landis Street

San Diego, CA 92105

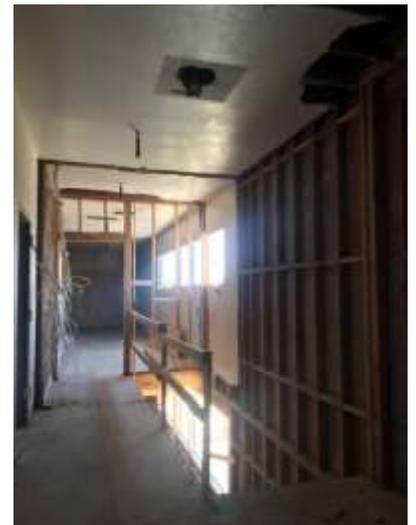
San Diego, CA 92105



**Tour Guide:** Jayna, Robert

**What I Learned:** Phase I of this project was fixing up the outside space and building a new skatepark. For Phase II, they took the old YMCA building and are now renovating it to become Park De La Cruz's new recreation center.

From my walkthrough with Robert and Jayna I learned that they are adding in an elevator for ADA and turning the women and men's locker rooms into conference rooms. The foundation of the building is a concrete slab over joists and the walls are 3/8" shear wall with drywall over it. I also learned that they had an inspector check for lead in the tile and asbestos in the black glue which held the mirrors before they were able to demolish anything. They hid the HVAC with soffits and had the plumbing go vertically and horizontally. Most of the rooms have drop ceilings because the ceilings are either too high or they need to hide the HVAC systems. I learned that if you see a saddle, copper, and black iron in a room, it is most likely a bathroom. The saddle is for the toilet, and the copper and black iron are for the plumbing.



# CONCRETE TESTING

Concrete is checked twice:

1. At the concrete plant when it's being poured into the ready-mix truck.
  - a. This is a visual check by the lab inspector. They need to check if the concrete mix is too dry or too wet and if the mix is continuously mixing before heading to a site. The ready-mix truck must arrive at the site in 1.5 hours from leaving the plant or else the concrete is not good anymore.
2. At the project site when pouring.
  - a. Three cylinders of concrete from the ready-mix truck are taken on site and brought to the lab for testing. The samples are typically 4x8 cylinders. If it is for a structure, they take 6x12 sample cylinders.



The concrete cylinders are kept in the curing or moisture room, to cure and get stronger. The idea is that concrete never stops getting stronger, but it does see exponential growth and starts to slow down. They test one cylinder at seven days to see if it's at 70% of its maximum strength. They test the other two cylinders at 28 days, which is the day it reaches its maximum strength.



Before the concrete break can begin, the cylinders need to be capped with a sulfur compound that is melted to 265° - 285° F. This allows a flat surface to be pressed against the machine. Lab technicians need to make sure there are no air bubbles in the cap or else it will pinpoint the load and not give the right representation of the break.

Once the cylinder is capped, it is ready to be tested with the \$100,000 machine. The cylinder is placed in the machine and compressed until it essentially explodes. If the concrete is at the right PSI, it's good to go. If the PSI is weaker than the mix was intended to be, the lab technicians have to inform the plant, the resident engineer and the contractor to have that poured concrete replaced. The lab technicians also look at how the cylinder broke. The picture on the right is an example of a column break.



# COLLEGE, CAREER AND LIFE LESSONS

- I used to want to be a mechanical engineer. The many civil engineers I have met through this experience have all told me the same thing; civil engineering opens various doors for all kinds of people. If you don't like design, you can try the lab. If you don't like the lab, you can try construction management. This is what convinced me to switch my interest to civil engineering.
- Before internship I was certain that if I was going to go to any school in San Diego, it would only be UCSD. During internship I found out that SDSU is one of the best engineering schools, and that many of the people that worked in my office graduated from SDSU. Also, UCSD doesn't offer civil engineering!
- The guys at the lab advised to get your Engineer in Training (EIT) license in your junior or senior year of college. They informed me that later engineers take the Professional Engineer (PE) license test to pursue a more successful career. If you obtain your EIT in college, you can take your PE within 2 years of working under a licensed engineer. Without an EIT license you must wait 15 years, before you can take your PE license test.
- Many people told me that engineering school is going to be tough. Tony reassured me that it's okay if you fail a class. He reminded me that everyone learns differently, and all teachers won't teach in the way that you best learn. Randy told me to stick with it, even when it gets exceptionally hard, because it will be worth it in the end.
- Ray told me that going to college is very important to be successful in the engineering field. He said go to school, but know that when you get to the workplace, all the stuff you learned at school won't apply to your daily activities. He said internships are very important, because it's the experience that will lend you a hand in the long run.
- Sean told me not to be afraid to talk to a contractor. Communication is key in engineering projects, and you should never hesitate to ask questions or be up front about something you notice.
- Scott taught me to always keep good relations with your contractors and always do what you say. If you do these two things, you're doing your job right.
- The surveyors and lab technicians taught me to plan for my future! Look for a job that offers pension, and if it doesn't start planning early.

## Mock RFP: Internship Experience at Public Works Department, City of San Diego

- Jacob taught me that public speaking is a mental game. He said don't expect it to be perfect. He showed me the value of power poses and burning excess energy that could be emulating anxiety. Most importantly, he said something that has stuck with me, "a confident individual takes up a lot of space."
- Myrna taught me the importance of being an advocate for women in STEAM fields. She told me to get used to the significant difference in male to female engineers, but she also taught me to be motivated by it.
- Through his song parodies about surveying, Bill taught me that there is always a way to mix your passions together.
- Manuel, Tony, and Julius told me to pursue my passion, that no amount of money will make me as happy as doing that.

# APPRECIATIONS

I would like to dedicate this page to thank the following individuals for taking the time and energy to teach, mentor and inspire me\*:

## **Major Buildings**

Tony Perez  
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Zina Rumanni  
Nick  
Hiep  
Julius  
Fadi  
Salam

## **Survey**

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Brandon  
Bill  
David

## **Downtown**

Nikki Lewis  
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Bryan Salguero  
Christian Ruvalcaba  
Michael  
Shannon

## **Materials Lab**

Randy Encinas  
Warren  
Troy  
Ray  
Victor  
Shaun

## **Bridges**

James Brown  
Jerald

## **Other**

Myrna Dayton

\*My apologies for not knowing all last names.